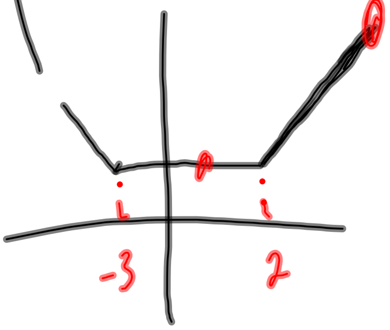
31. $y = |x-2| + |x+3| \qquad -5 \le x \le 5$

do graphically

$$\frac{d}{dx}|x| = \frac{|x|}{x} = \operatorname{sign}(x) = \begin{cases} 1 & \text{if } x>0 \\ -1 & \text{if } x<0 \end{cases}$$



abs max is 11 at $x=5$

abs min is 5 at x in $[-3,2]$

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35. $y = x^{2/3}(x+2)$ c.p., local extrema

$y' = x^{2/3}\cdot 1 + (x+2)\frac{2}{3}x^{-\frac{1}{3}}$

$y' = \sqrt[3]{x^2} + \dfrac{2(x+2)}{3\sqrt[3]{x}} = 0$ $\qquad y' \nexists$ if $x=0$

$y=0$ min

c.p.

$3\sqrt[3]{x}\cdot\sqrt[3]{x^2} = -\dfrac{2(x+2)}{\cancel{3\sqrt[3]{x}}}\cancel{3\sqrt[3]{x}}$

$3\sqrt[3]{x^3} = 3x = -2x-4$

$5x = -4$

$y'\left(-\frac{4}{5}\right) = 0 \qquad x = -\frac{4}{5} \qquad y = \left(-\frac{4}{5}\right)^{4/3}\left(-\frac{4}{5}+2\right)$ max

c.P.

sign y': $+ \ 0 \ - \ \nexists \ +$ ($-4/5$, 0)

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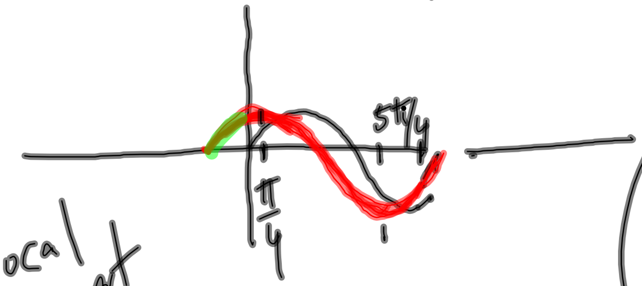
15. $y=\sin\left(x+\frac{\pi}{4}\right)$ $\quad 0\le x\le \frac{7\pi}{4}$



local min at $x=0$

$y'=\cos\left(x+\frac{\pi}{4}\right)=0$

abs max is 1 at $x=\frac{\pi}{4}$

abs min is -1 at $x=\frac{5\pi}{4}$

local max at $x=\frac{7\pi}{4}$

$x+\frac{\pi}{4}=\frac{\pi}{2}, \frac{3\pi}{2}$

C.P. $\quad x=\frac{\pi}{4}, \frac{5\pi}{4}$

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4.2 The mean value Theorem MVT

interval $[a,b]$

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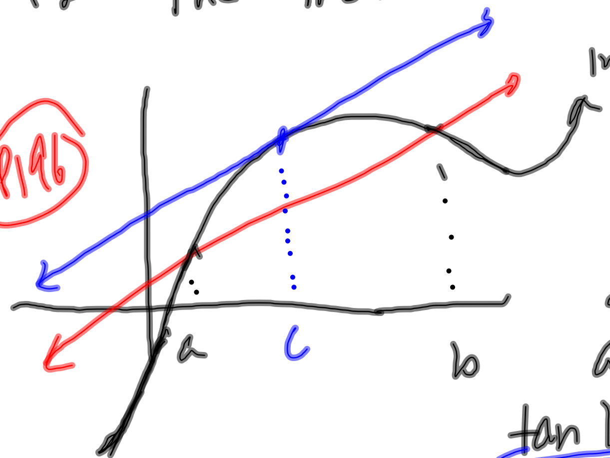

there is some place between a & b where the tan line || sec line

(same slope)

$f'(c)=\frac{f(b)-f(a)}{b-a}$

Hypothesis (conditions)

only works if $f(x)$ is continuous on $[a,b]$ and differentiable on (a,b)

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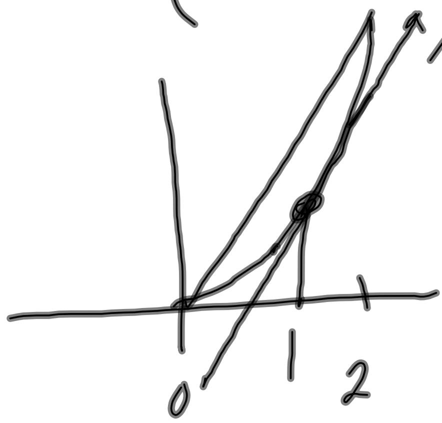
$f(x) = x^2$ $[0,2]$ find the value that satisfies the mvt

$f'(x) = 2x$ a, b

$f'(c) = \dfrac{f(b) - f(a)}{b-a}$

(find c)



$2c = \dfrac{4-0}{2-0}$

$2c = 2$

$c = 1$

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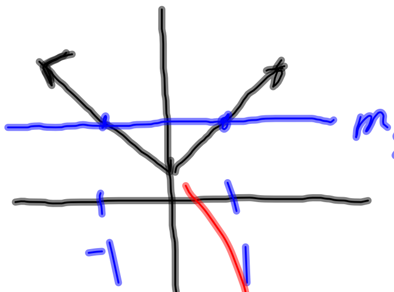
Ex 2 (a) $y = \sqrt{x^2} + 1$ $[-1, 1]$

$y = |x| + 1$



$m_{sec} = 0$

not diff at $x=0$

fails to meet condition:

diff on (a,b)

Oct 20-2:02 PM

if $f' > 0$ f is inc

if $f' < 0$ f is dec

Oct 20-2:08 PM